Disclaimer

The document which accompanies this disclaimer is American Cyanamid's avian and aquatic risk assessments. The document presents the company's views. It does not represent EPA's views, which are posted separately at this homepage address. This document is being posted on the EPA homepage at American Cyanamid's request.

The reader may notice that several pages contain the statement "confidential." American Cyanamid has consented to the publication of this document, thereby waiving all claims that this document contains confidential business information.

CONFIDENTIAL

DATE SUBMITTED : ______ NO.: ______ VOLUME : ______

American Cyanamid Report Number EXA 97 - 006

Study Title

Modeling the Predicted Concentrations of Chlorfenapyr in Water and Sediment in Ponds from the Use on Cotton

Data Requirement

None - Supplemental Data

Author

G. Mangels
Study Director

Study Completed on:

December 15, 1997

Performing Laboratory
American Cyanamid Company
Agricultural Research Division
P.O. Box 400
Princeton, New Jersey 08543-0400

Laboratory Project Identification

None

Total Number of Pages : 84

84

CY181

AMERICAN CYANAMID COMPANY
AGRICULTURAL RESEARCH DIVISION

Issue Date: 12/15/97

STATEMENT OF DATA CONFIDENTIALITY CLAIMS

No claim of confidentiality is made for any information contained in this study on the basis of its falling within the scope of FIFRA 10 (d) (1) (A), (B), or (C).

Company : American Cyanamid Company

Company Agent : ______________________ Date : ____________________

______________________ ______________________

Title Signature

We submitted this material to the United States Environmental Protection Agency specifically under provisions contained in FIFRA as amended and thereby consent to use and disclosure of this material by EPA according to FIFRA. Notwithstanding the marking, "CONFIDENTIAL", this marking by itself conveys no supplemental claims of confidentiality under FIFRA sections 10(a) or 10(b). In submitting this material to the EPA according to the method and format requirements contained in PR Notice 86-5, we do not waive any protection or right involving this material (anywhere else in the world) that would have been claimed by the Company if this material had not been submitted to the EPA.

CY 181

AMERICAN CYANAMID COMPANY
AGRICULTURAL RESEARCH DIVISION

Issue Date: 12/15/97

STATEMENT OF GLP COMPLIANCE

This study was not conducted according to any Good Laboratory Practice regulations because the work performed is not classified as a study since a test compound is not applied to a test system.

G. Mangels - Study Director

12/15/97
Date

Submitter/Sponsor

CY 181

American Cyanamid Company
Agricultural Research Division
Princeton, NJ 08543-0400 USA

Report No.:	EXA 97-006	**Study Initiation Date:**	NA
Type of Report:	Final	**Expt. Start Date:**	NA
Type of Study:	Exposure Assessment	**Expt. Termination Date:**	NA
Protocol No.:	None	**Study Completion Date:**	NA
Reported By:	G. Mangels	**Report Issue Date:**	97DEC15

TITLE

Modeling the Predicted Concentrations of Chlorfenapyr in Water and Sediment in Ponds from the Use on Cotton

PURPOSE

The objective of this study was to calculate the predicted environmental concentrations of chlorfenapyr in pond water and sediments due to drift and runoff following applications on cotton. The results of the modeling will be used in the aquatic risk assessment of chlorfenapyr by providing potential exposure levels of aquatic organisms to chlorfenapyr.

SUMMARY

The potential concentrations of chlorfenapyr in pond water and sediments were modeled in five regions of the U.S. using MUSCRAT (beta version 1.0). The regions were : Region 4 (AL, GA, KY, NC, SC, TN, VA); Region 5 (FL), Region 6 (AR, LA, MO, MS, OK); Region 7 (TX) and Region 11 (AZ, CA). MUSCRAT (Multiple Scenario Risk Assessment Tool) is a software tool which : (1) develops a set of input parameters for PRZM (version 3) and EXAMS (version 2) based on the crop of interest and the locations where the crop is capable of being grown; (2) using PRZM, calculates on a daily basis for 36 years at up to 25 sites in each region the amount of the product which will move from a field and be present in run-off water and attached to sediment; (3) using EXAMS, calculates the daily concentrations of the chemical in a farm pond; and (4) then processes the results to determine the daily concentrations and several time weighted average concentrations.

The soil properties, cropping patterns and climatic conditions were selected by the MUSCRAT processor based on publicly available databases using soils which had been evaluated by the NRCS (Natural Resource Conservation Service, formerly the SCS) as having the potential to grow cotton. The pesticide specific properties which were input into PRZM to determine the concentrations in run-off are summarized below.

CY181

PRZM Input Values

Applications : Except for Region 11 (AZ and CA), two different application timing scenarios were used : early applications of 0.3 lb. a.i./acre on July 7 and 0.2 lb. a.i./acre on July 15; late applications of 0.3 lb. a.i./acre on August 15 and 0.2 lb. a.i./acre on August 21. In Region 11, applications of 0.2 lb. a.i./acre were made on June 15 and 0.3 lb. a.i./acre on July 15. All of the applications were made by ground and assumed 1% drift off target. In Region 6 (the Delta) aerial applications assuming 5% drift were also simulated, but it was shown that the ground applications resulted in higher aquatic concentrations since 95% of the material was delivered to the field with a ground application, but only 75% is delivered with aerial applications. All of the applications were made to foliage in which the crop canopy was growing in a linear mode.

The soil half-life in the top horizon was 433 days, the 95% confidence interval for the six field studies conducted. The field half-life values were used rather than the aerobic soil metabolism half-lives since it has been shown that both aerobic soil metabolism and photolysis play significant roles in the degradation of chlorfenapyr. An additional set of simulations was conducted using an aerobic half-life of 1340 days and these results indicated that the worst-case concentrations in water changed by less than 1 ppb.

EXAMS Input Values

Except for a modification in the default value for the amount of chlorfenapyr which would remain on the sediment after the initial desorption from the sediment into the water column (default = 50%; a very conservative estimate of 90% remaining on the sediment was used), only a few simple physical properties and biotic degradation half-lives for water and sediment were used.

The predicted concentrations of chlorfenapyr in the water and sediment due to spray-drift and run-off in water and sediment from treated fields were calculated. The concentrations at the day of application and after 96 hours and 21 days are compared with the toxicity endpoints of concern in an aquatic risk assessment. The predicted maximum concentrations in the water and sediment are summarized in the table below.

Predicted Concentrations (ppb) of Chlorfenapyr in Water and Sediment

	Ground	Instantaneous		96-Hour		21-Day	
Region	Application	Water	Sediment	Water	Sediment	Water	Sediment
4	Early	3.00	527	2.35	526	1.57	525
5	Early	3.03	461	2.30	461	1.67	458
6	Early	3.64	623	2.91	623	1.89	619
7	Early	4.26	433	3.08	433	1.50	431
4	Late	2.52	464	2.10	464	1.34	462
5	Late	2.75	364	2.19	364	1.19	361
6	Late	3.46	559	2.78	559	1.84	556
7	Late	2.85	323	2.06	323	1.08	319
11	0.2 June & 0.3 July	0.96	130	0.74	129	0.45	128

As expected, the predicted concentrations of chlorfenapyr in the pond are slightly higher for earlier season applications due to the lower amount of interception by the crop canopy since the canopy is not well developed. It should be noted that in generating these values there are mitigation measures on the label which are expected to reduce the potential risk to aquatic organisms. These mitigation measures include the use of vegetative buffer strips between treated areas and adjacent water bodies. The use of vegetative buffers will significantly reduce the potential movement of sorbed residues of chlorfenapyr into the pond, thereby significantly reducing the major pathway by which residues of chlorfenapyr enter water bodies.

In order to determine how the potential magnitude of the risks may be influenced by uncertainty, or variability in some of the input parameters, several runs were made which examined the effect of soil half-life, desorption from soil moving into the pond, vegetative buffer strips, and aerial versus ground applications. All of the simulations were conducted in Region 6, the Delta, using the early application timing which gave the highest single sets of values. A summary of the results is presented in the table below.

	Instantaneous		96-Hour		21-Day	
Parameter	Water	Sediment	Water	Sediment	Water	Sediment
Early	3.64	623	2.91	623	1.89	619
Aerial Application	3.14	543	2.44	543	1.67	541
1370 Day Soil Half-life	4.36	765	3.47	762	2.36	753
Vegetative Buffer w/ 50% Sediment Removal	2.97	526	2.21	526	1.62	526
Desorption Koc in Soil Adsorption Koc in Pond	3.46	555	2.59	554	1.66	552

In examining the results of these modeling simulations it is important to keep in mind that in selecting the soils to be used in the analysis, the selection was made from all of the soils which had been evaluated by the NRCS (Natural Resource Conservation Service, formerly the SCS) as having the potential to grow cotton. The values listed in the tables above are the worst-case value from all of the representative soils in each of the regions. In many cases the concentrations are significantly lower in areas representing approximately 10 - 20% of the potential areas. This is very significant because many of the soils giving the highest predicted concentrations are from soils with very high slope, including average slopes of up to 15%. Under modern agriculture these types of runoff conditions would not exist due to the need for erosion control. Therefore the values generated are extremely conservative, especially since it is extremely unlikely that the soil half-lives in each of the 36 years of application would be at the upper 95% confidence interval for field half-lives.

Table of Contents

1. Background 8

A. General Overview of the Pesticide 8

B. Previous Modeling 8

C. Current Modeling 8

2. Modeled Uses, Application and Associated Management Practices 10

3. Pesticide Fate and Transport 10

4. Justification of Model Selection 12

5. Use/Scenario Description and Selection Justification 12

6. Input Documentation Table 12

7. Input Substitutions and/or Estimations 12

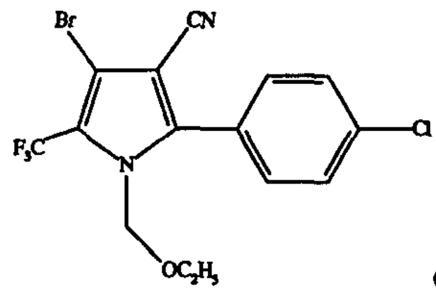
8. Results (Output) 12

Figure and Tables 15

1. Background

A. General Overview of the Pesticide

1. **Common Name :** Chlorfenapyr
2. **Chemical Name:** **IUPAC** - 4-bromo-2-(4-chlorophenyl)-1-(ethoxymethyl)-5-(trifluoromethyl)-pyrrole-3-carbonitrile
   CAS - 4-bromo-2-(4-chlorophenyl)-1-(ethoxymethyl)-5-(trifluoromethyl)-1H-pyrrole-3-carbonitrile
3. **Structure :**



CAS Number: 122453-73-0

4. **Type of Pesticide :** Insecticide
5. **Type of Use :** Terrestrial Food
6. **Major Uses :** Cotton
7. **Major formulations :** Suspension Concentrate
8. **Types of Application :** Aerial and ground spray onto foliage
9. **Application timings :** Applications can be made at various times throughout the growing season, depending upon insect pressure. For the modeling four different application timings were used : (1) early applications of 0.3 lb. a.i./acre on 7 July, followed by 0.2 lb. a.i./acre on 15 July; (2) late applications of 0.3 lb. a.i./acre on 15 August, followed by 0.2 lb. a.i./acre on 21 August; (3) early applications of 0.3 lb. a.i./acre on 15 July, followed by 0.2 lb. a.i./acre on 15 August; and (4) for California and Arizona only, early applications of 0.2 lb. a.i./acre on 15 June, followed by 0.2 lb. a.i./acre on 15 July.

B. Previous Modeling

PRZM/EXAMS modeling had previously been conducted by EPA (February 11, 1997) using a cotton field in Mississippi and a field in Texas. The modeling assumed three aerial applications of chlorfenapyr at 1.05 lb. a.i./acre with 75% of the dose reaching the field and 5% of the dose being deposited onto the surface of the pond. The calculated 4-day and 21-day EEC values were 5.17 - 10.06 and 3.82 - 8.97 ppb, respectively.

C. Current Modeling

The modeling work described in this report was conducted using MUSCRAT (Multiple Scenario Risk Assessment Tool), a software tool which : (1) develops a set of input parameters for PRZM (version 3) and EXAMS (version 2) based on the crop of interest and the locations that the product will be used; (2) using PRZM, calculates on a daily basis for 36 years at up to 25 sites in each region the amount of the product which will run-off a field and be present in run-off water and attached to sediment; (3) using EXAMS, calculates the daily concentrations of the chemical in a farm pond; and (4) processes the results to determine the daily concentrations and several time weighted average concentrations.

\ 91 CY 181

In the development of MUSCRAT, the contiguous United States was divided into eleven regions (Figure 1). Information on cotton production in the U.S. was obtained from the annual Agricultural Statistics produced by the USDA. The number of acres planted in each state from 1983 to 1996 is given in Table 1. From these data, the percentage of the national acreage planted in each state was calculated and is given in Table 2. These data were then combined to determine the percentage of the total acreage found in each of the regions (Table 3). Five regions (4, 5, 6, 7 and 11) accounted for 99% of the total acreage planted and were used in the analysis. It is interesting to note that the percentage distribution among the regions has changed over the years (Figure 2).

Region	States
4	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia
5	Florida
6	Arkansas, Louisiana, Missouri, Mississippi, Oklahoma
7	Texas
11	Arizona, California

The soil properties, cropping patterns and climatic conditions were selected by the MUSCRAT processor based on publicly available databases using soils which had been evaluated by the NRCS (Natural Resource Conservation Service, formerly the SCS) as having the potential to grow cotton. The properties of the soils used are found in Table 4. The pesticide specific properties which were input into PRZM to determine the concentrations in run-off are summarized below.

PRZM Input Values	Reference
Koc = 11500 (median)	MRID # 43492849
Soil Half-life : 433 days	MRID # 43492850 & MET 97-012
1370 days (aerobic soil metabolism)	
280 days (average field dissipation value)	

Pesticide Applications

Two different application timings were used, except for Region 11 (AZ and CA),:

Early applications : 0.3 lb. a.i./acre on July 7 and 0.2 lb. a.i./acre on July 15
Late applications : 0.3 lb. a.i./acre on August 15 and 0.2 lb. a.i./acre on August 21

In Region 11 : 0.2 lb. a.i./acre on June 15 and 0.3 lb. a.i./acre on July 15.

All of the applications were made by ground and assumed 1% drift. In Region 6 (the Delta) aerial applications assuming 5% drift were also simulated. Results showed that the ground applications resulted in higher aquatic concentrations since 95% of the material is deposited onto the field with a ground application, but only 75% is deposited onto the field with aerial applications. All of the applications were made to foliage in which the crop canopy was growing in a linear mode (CAM = 2).

CY 181

EXAMS Input Values

MW : 407.6	
Koc = 11500	MRID #43492849
Water Solubility = 0.12 ppm	MRID #42770203
VP = 4E-08 torr	ENV 96-118
Water Half-life = 100 Days (Sediment/water Study)	MRID #439042-02
Sediment Half-life = 250 days (Sediment/water Study)	MRID #439042-02

2. Modeled Uses, Application and Associated Management Practices

A. Product Name : PIRATE® Cotton Insecticide/ALERT® Insecticide-Miticide

B. Formulation : Suspension Concentrate

C. Percentage active ingredient : 30.83% and 21.44%

D. Major Used: Cotton

Types of Applications : Ground and Aerial

Application Timings :

Except for Region 11 (AZ and CA), two different application timings were used :

Early applications : 0.3 lb. a.i./acre on July 7 and 0.2 lb. a.i./acre on July 15

Late applications : 0.3 lb. a.i./acre on August 15 and 0.2 lb. a.i./acre on August 21

In Region 11 : applications of 0.2 lb. a.i./acre on June 15 and 0.3 lb. a.i./acre on July 15.

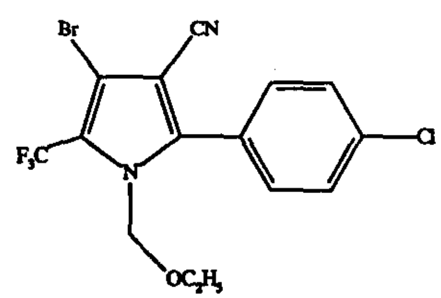
Maximum Annual Application Rate : 0.5 lb. a.i.

Typical Number of Applications Per Year : Two

Typical Maximum Application Rate/Single Application : 0.3 lb. a.i./acre

Typical Minimum Interval Between Applications : 7 Days

3. Pesticide Fate and Transport



Structure	
Chemical name (IUPAC)	4-bromo-2-(4-chlorophenyl)-1-(ethoxymethyl)-5-(trifluoromethyl)-pyrrole-3-carbonitrile
Chemical name (CAS)	4-bromo-2-(4-chlorophenyl)-1-(ethoxymethyl)-5-(trifluoromethyl)-1H-pyrrole-3-carbonitrile
CAS Number	122453-73-0
Molecular weight	407.6
Molecular formula	$C_{15}H_{11}BrClF_3N_2O$

CY181

93

Water solubility	0.12, 0.13, 0.14, and 0.12 ppm in deionized water and pH 4, 7, and 10 buffers, respectively (MRID #42770203)
Vapor pressure	4.05 x 10-8 torr at 25°C (ENV 96-118)
K_{ow}	67,670 (Log K_{ow} = 4.83) (MRID #42770203)
Hydrolysis	Stable to hydrolysis over 30 days in pH 5, 7, and 9 buffers (MRID #42770240)
Aqueous photolysis	Half-life 5-7 days in pH 5, 7, and 9 buffers (MRID #42770241)
Aquatic biodegradation	Half-life in water - 100 days (MRID # 439042-02) Half-life in sediment - 250 days
Soil photolysis	Half-life 130 ± 40 days (MRID #42770242)
Aerobic Soil (Lab)	Half-lives: 1370 days - sandy loam (NJ) (MRID #42770243) 230 days - alluvial clay loam (Japan) 250 days - volcanic ash light clay (Japan) 241 days - clay soil (TX) 349-415 days - sandy loam (CA, MS, NC, NJ)
Anaerobic Soil (Lab)	Half-life 670 days - sandy loam (NJ) (MRID #4349287)
Field Dissipation	Half-lives : 175, 241, 251, 279, and 418 days (MRID # 43492850) Half-life in 14C-field study - 275 days (MET 97-012)
Kd_{ads}	32 - 155 (MRID #43492849)
Kd_{des}	67 - 362 (MRID #43492849)
K_{oc}	11,500 (Median) (MRID #43492849)

In addition to these studies, a small-scale field exposure study was conducted in order to obtain information about the residue levels of AC 303,630 in cotton plants as a result of two different application timings for control of thrips and Heliothis (MRID #43492814). This study, the results of which are described below, was used to estimate the half-lives on cotton plants.

The application for thrips was made early in the growing season, when cotton was in the 4-6 leaf stage. AC 303,630 was applied as a 3SC formulation at a rate of 0.2 lb. a.i./acre. The levels of AC 303,630 detected in the various samples taken over a period of 28 days are shown in the table below.

	Time After Application (Days)					
	0.2	1	3	7	14	28
Concentration (ppm) on Cotton Leaves	34.4	26.6	8.93	1.41	<0.5	<0.5

CY181

The application for Heliothis was made one month later in the growing season, when a canopy had been established. AC 303,630 was applied as a 3SC formulation at a rate of 0.4 lb. a.i./acre. The levels of AC 303,630 detected in the various samples taken over a period of 28 days are shown in the table below.

	Time After Application (Days)					
Sample	0.2	1	3	7	14	28
Concentration (ppm) in						
Cotton Leaves (Upper Canopy)	98.9	61.5	45.3	27.2	6.9	3.3
Cotton Leaves (Lower Canopy)	39.8	20.6	33.9	26.0	6.63	4.3

These data show that the half-lives of AC 303,630 on cotton leaves are less than one week and approximately 3- 4 days. A conservative foliar half-life value of 7 days was used in the assessment.

4. Justification of Model Selection

The PRZM/EXAMS models, which were developed by EPA, are two highly used models for predicting exposures. PRZM evaluates the potential movement of compound through the soil profile and from the soil surface by erosion and run-off. PRZM is used to calculate the amount of a compound which may enter a water body in run-off water and adsorbed onto sediment. The EXAMS model is used toevaluate the fate of chemicals in water bodies. The use of these models in conducting aquatic risk assessments has been recommended by the EMWG (Exposure Modeling Work Group - a consortium of industry, EPA and contractors who deal with environmental fate and risk assessments). The MUSCRAT processor was developed by Cyanamid in close consultation with EPA and members of the EMWG and is being recommended for use in Tier II and Tier III modeling.

5. Use/Scenario Description and Selection Justification

The various scenarios were selected as part of the development of MUSCRAT which was performed in consultation with EPA and the FIFRA Environmental Modeling Work Group.

6. Input Documentation Table

An example of the input files is given in Table 5.

7. Input Substitutions and/or Estimations

The only input substitution was in the EXAMS input parameter PRBEN (the percentage of the sorbed compound which is delivered to the benthic zone), which was changed from the default value of 0.5 (50%) to 0.9 (90%) based on the very large adsorption/desorption coefficients.

8. Results (Output)

The results of the simulations are shown graphically as area exceedance distributions for both the water (Figures 4a - 16a) and sediment phases (Figures 4b - 16b) and the values are given in Tables 6 - 18 (a = water values, b= sediment values). In conducting risk assessments, the predicted concentrations are compared with the toxicity endpoints of concern. The results for the highest of the values in each of the regions are summarized in the table below.

CY 181

Predicted Concentrations (ppb) of Chlorfenapyr in Water and Sediment

	Ground	Instantaneous		96-Hour		21-Day	
Region	Application	Water	Sediment	Water	Sediment	Water	Sediment
4	Early	3.00	527	2.35	526	1.57	525
5	Early	3.03	461	2.30	461	1.67	458
6	Early	3.64	623	2.91	623	1.89	619
7	Early	4.26	433	3.08	433	1.50	431
4	Late	2.52	464	2.10	464	1.34	462
5	Late	2.75	364	2.19	364	1.19	361
6	Late	3.46	559	2.78	559	1.84	556
7	Late	2.85	323	2.06	323	1.08	319
11	0.2 June & 0.3 July	0.96	130	0.74	129	0.45	128

As expected, the predicted concentrations of chlorfenapyr in the pond are slightly higher for earlier season applications due to the lower amount of interception by the crop canopy since the canopy is not well developed. The values presented in these tables are the highest values within each region. An examination of Figures 4a-16a and Tables 6a-18a indicates that in many of the regions the concentrations in the water are significantly reduced when the area is approximately 15% of all of the soils which have the potential to grow cotton. However in many of these cases the soils which are responsible for the highest concentrations have very high slopes, in some cases as high as average slopes of 15%, as is shown in Table 4. Under modern agriculture many of these soils could not be used for agriculture due to the severe amount of erosion produced unless significant erosion control management measures, such as terracing, were used. Thus the actual potential maximum concentrations in these regions is therefore lower than the "peak" values which are observed in the low end (0-~15%) of many of these regions.

In addition to the factors listed above, it should be noted that in generating these values there are mitigation measures on the label which are expected to reduce the potential risk to aquatic organisms. These mitigation measures include the use of vegetative buffer strips between treated areas and adjacent water bodies. The use of vegetative buffers will significantly reduce the potential movement of sorbed residues of chlorfenapyr into the pond, thereby significantly reducing the major pathway by which residues of chlorfenapyr enter water bodies.

In order to determine how the potential magnitude of the risks may be influenced by uncertainty, or variability in some of the input parameters, several runs were made which examined the effect of soil half-life, desorption from soil moving into the pond, vegetative buffer strips, and aerial versus ground applications. All of the simulations were conducted in Region 6, the Delta, using the early application timing which gave the highest single sets of values. A summary of the results is presented in the tables below.

CY 181

Parameter	Instantaneous Water	Instantaneous Sediment	96-Hour Water	96-Hour Sediment	21-Day Water	21-Day Sediment
Early	3.64	623	2.91	623	1.89	619
Aerial Application	3.14	543	2.44	543	1.67	541
1370 Day Soil Half-life	4.36	765	3.47	762	2.36	753
Vegetative Buffer w/ 50% Sediment Removal	2.97	526	2.21	526	1.62	526
Desorption Koc in Soil Adsorption Koc in Pond	3.46	555	2.59	554	1.66	552

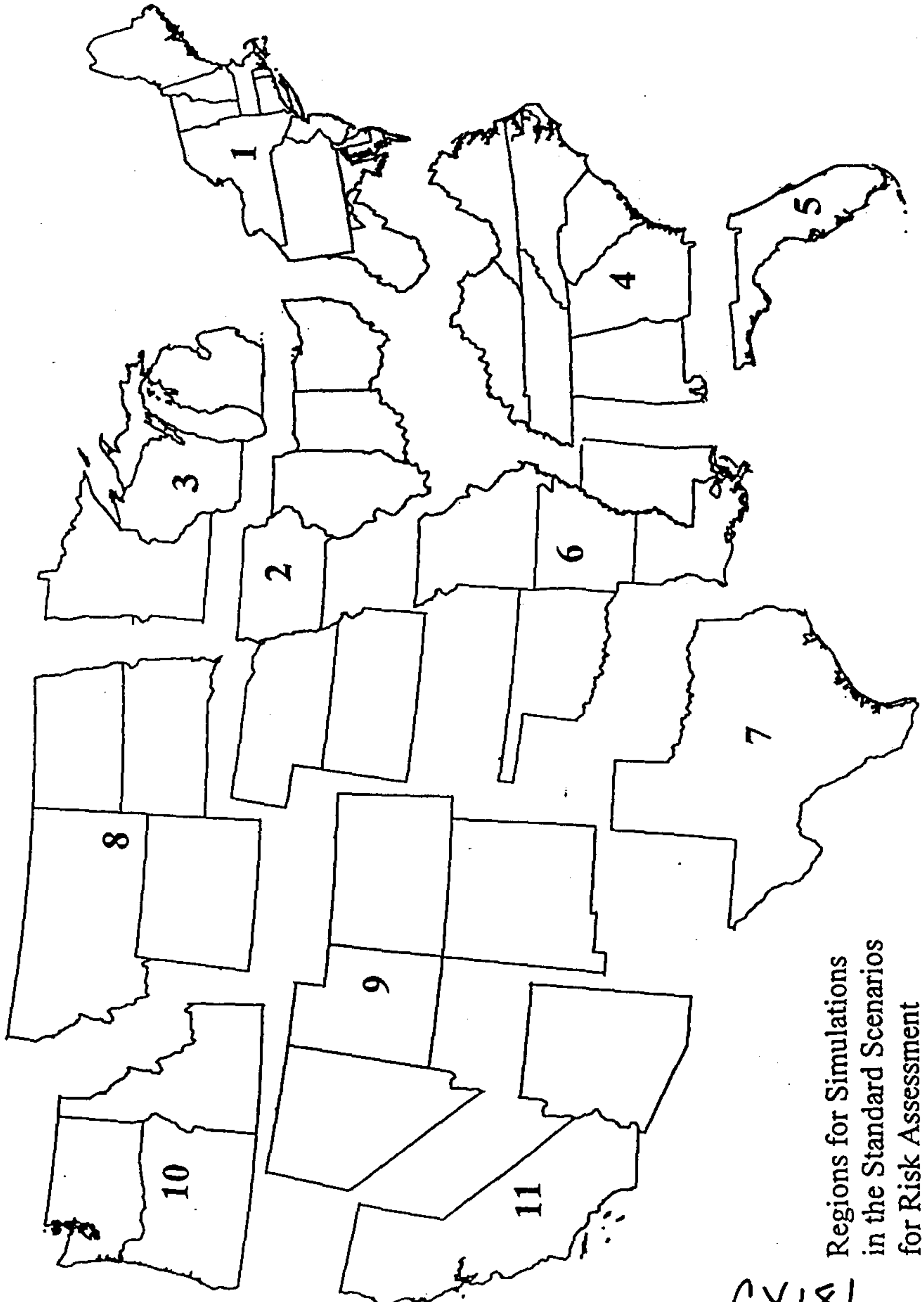
Potential exposures from aerial applications are lower than those from ground applications because significantly higher amounts of the pesticide reach the target in ground versus aerial applications (95% versus 75%). Even though it was modeled that 5X the amount of material reached the pond by spray drift from aerial versus ground applications (5% versus 1% of the applied dose) the predicted environmental concentrations from aerial applications were lower than from ground applications (maximum 96-hour averages of 2.44 versus 2.91 ppb). While all of the initial modeling was done with 433 day half-lives in soil (95% upper C.I. based on field half-lives) the use of the 1370 day half-life found in the initial aerobic soil metabolism study only raised the maximum 96-hour average from 2.91 to 3.47 ppb, or approximately 0.5 ppb. The use of vegetative buffers is generally expected to reduce the amount of soil movement off of a field by 40-80% (R.B. Daniels and J.W. Gilliam, Soil Sci. Soc. Am. J. 60:246-251(1996); T.A. Dillaha, et. Al, ASAE Vol.32(2) pg 513-519 (1989); William L. Magette, et. Al., ASAE vol 32(2) pg 663-667; Progressive Farmer, pg 14-16 (April 1995). Using a conservative value of a 50% decrease in the amount of soil entering a pond due to the use of a 25 foot buffer, the highest 96-hour average concentrations were reduced by approximately 25%, from 2.91 to 2.21 ppb. Using desorption coefficients from the soil and adsorption coefficients in the pond had a small reduction in the concentration. If each of these individual factors were to occur in conjunction with each other there would be a significant reduction in the highest potential concentrations.

Although the values generated in all of these cases are extremely conservative, especially since it is extremely unlikely that the soil half-lives in each of the 36 years of application would be at the upper 95% confidence interval for field half-lives, or longer, it has been demonstarted that, at worst, the values would be in the range which would be classified as restricted use.

Gary Mangels 12/15/97
Dr.Gary Mangels
Associate Research Fellow
Environemental/Exposure Assessment

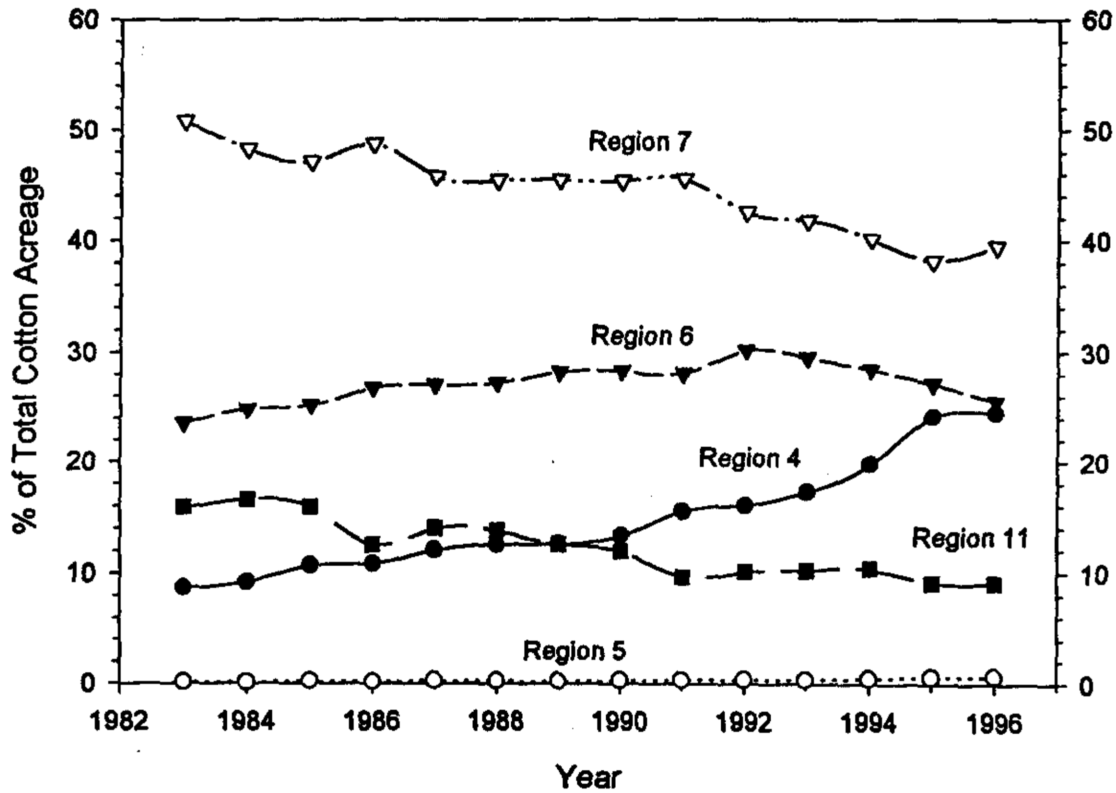
J. Devine 12/15/97
J. Devine
Associate Director
Environmental/Exposure Assessment

Figure 1. Locations of Regions in MUSCRAT



CY181

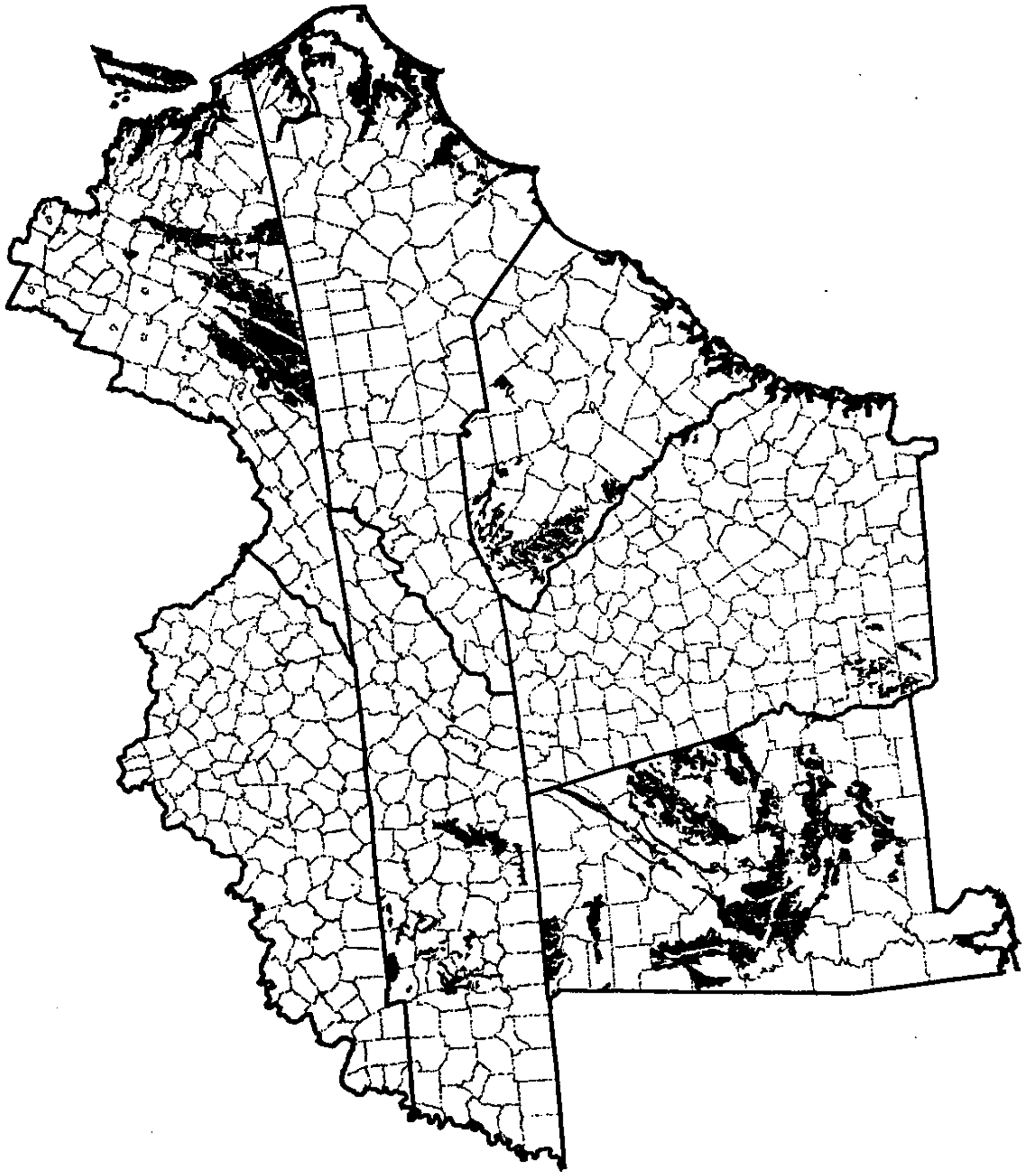
Figure 2. Distribution of Percentage of Acres Planted by Region over Time



CY 181

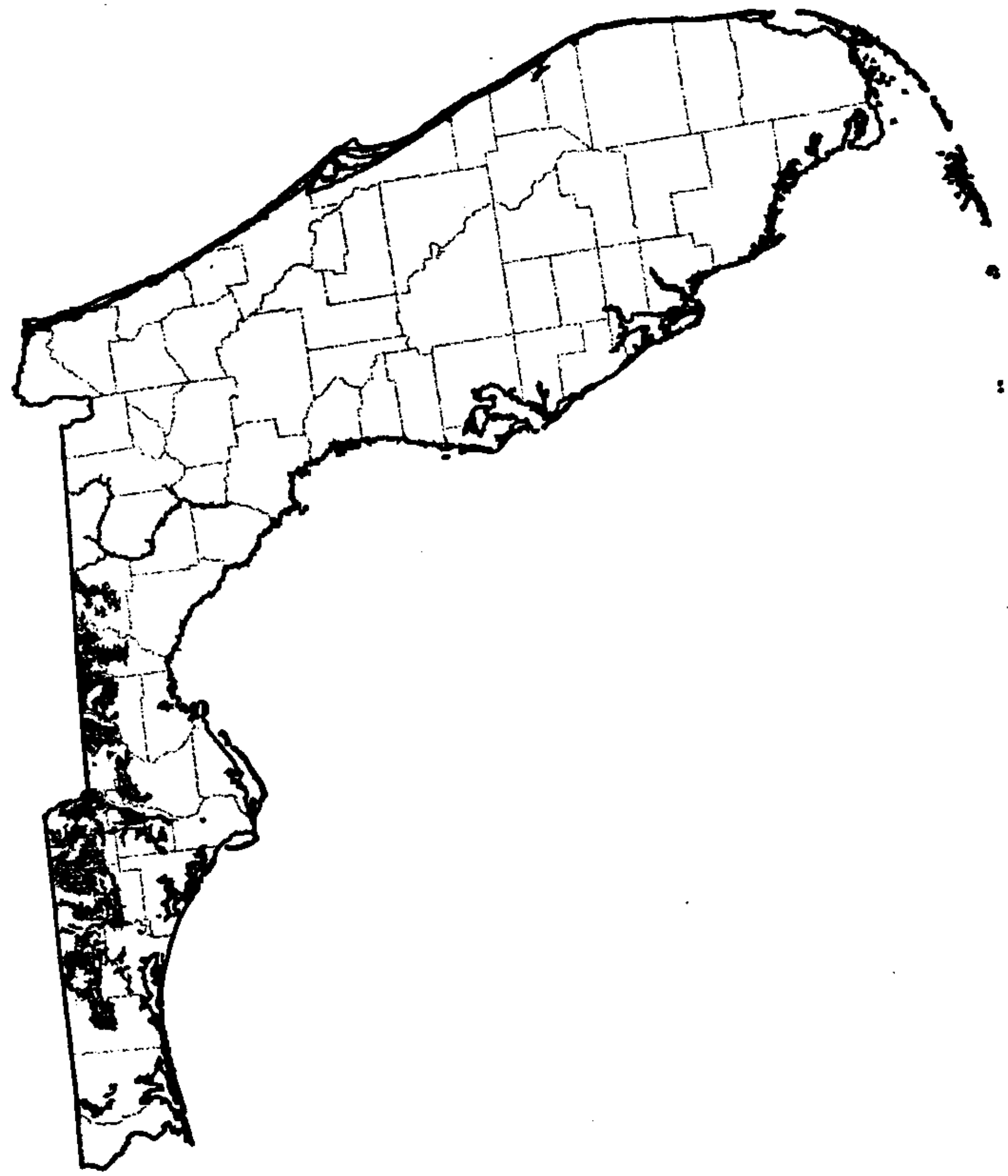
CONFIDENTIAL

Figure 3a. Locations of Soils Used in Modeling - Region 4



CY 181

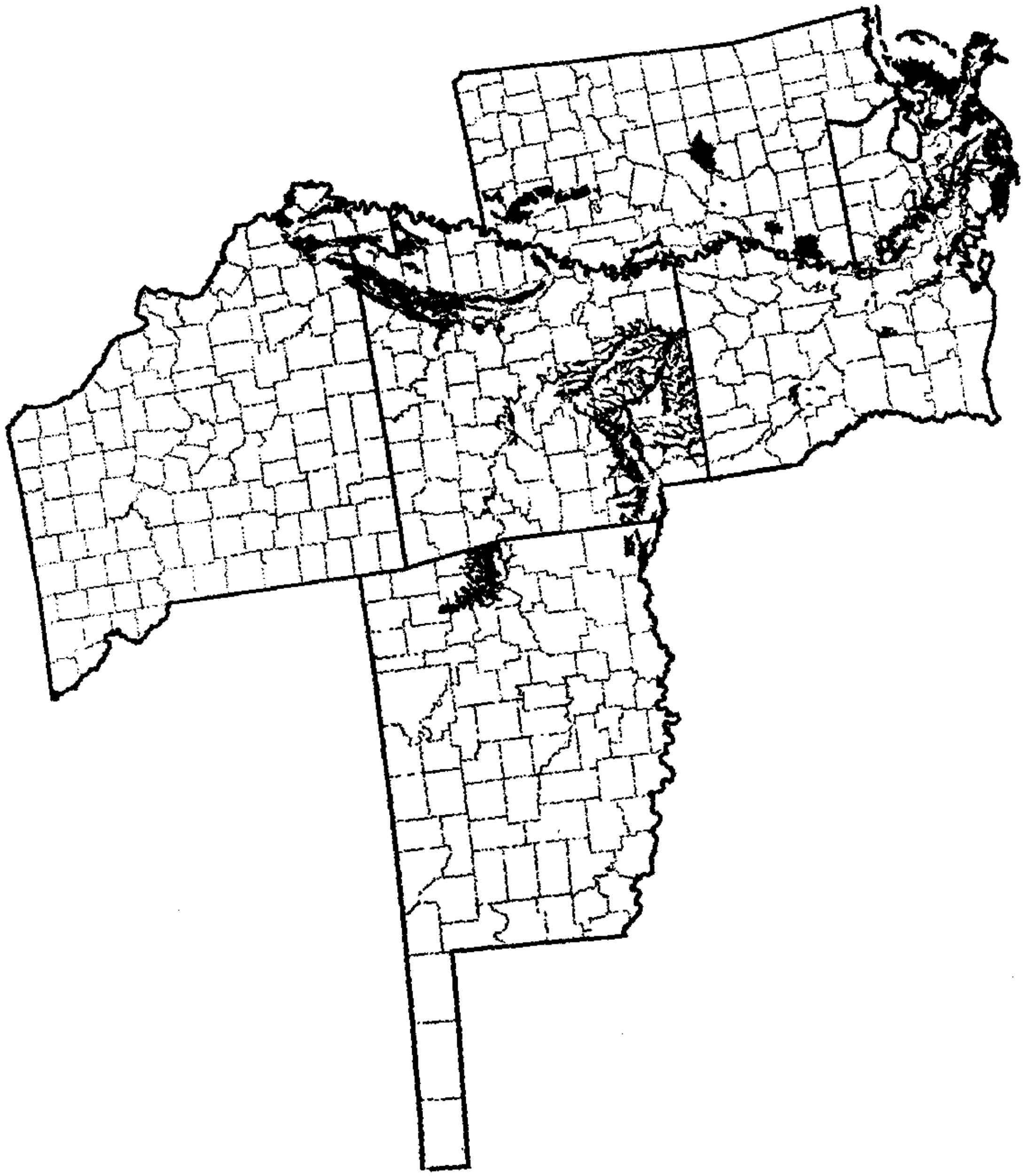
Figure 3b. Locations of Soils Used in Modeling - Region 5



CY 181

CONFIDENTIAL

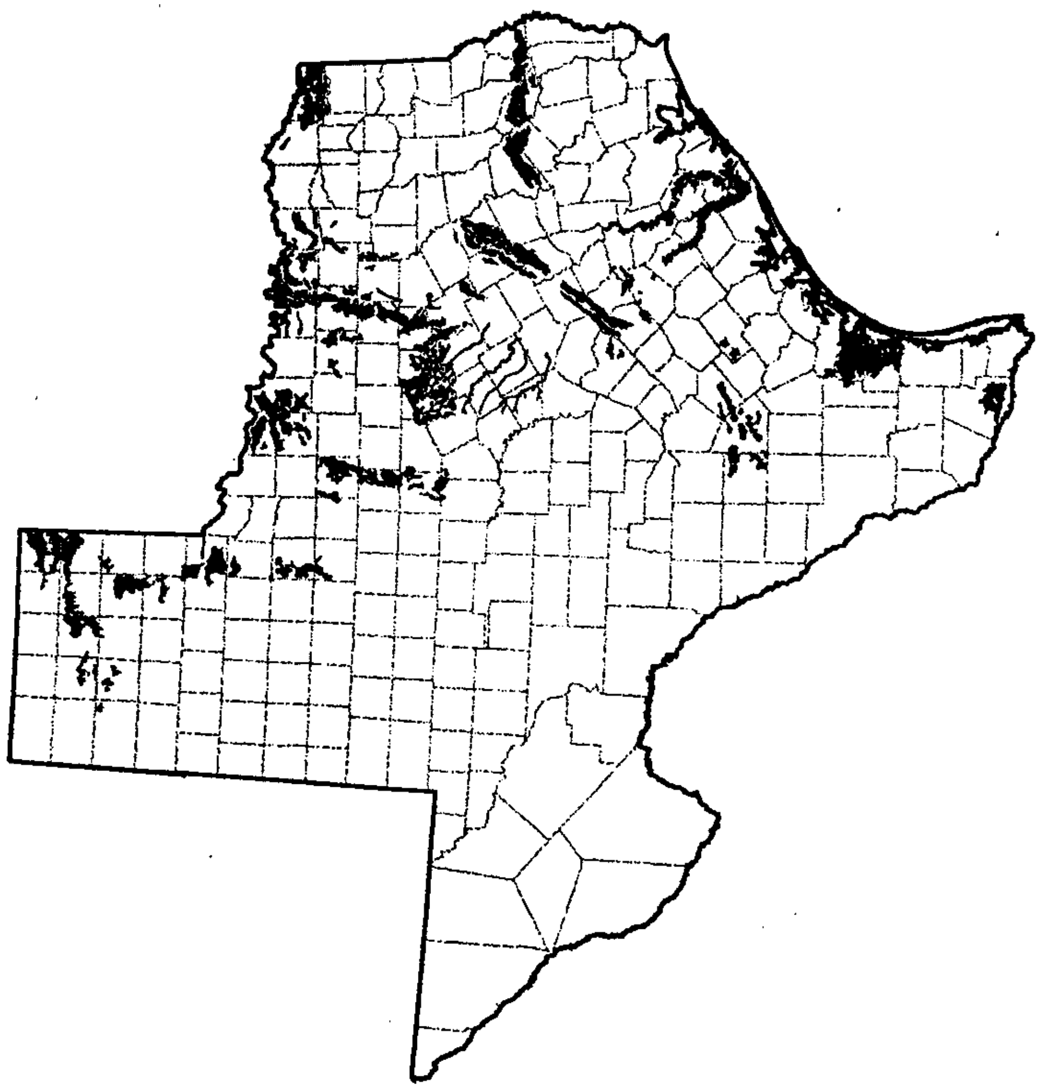
Figure 3c. Locations of Soils Used in Modeling - Region 6



CY 181

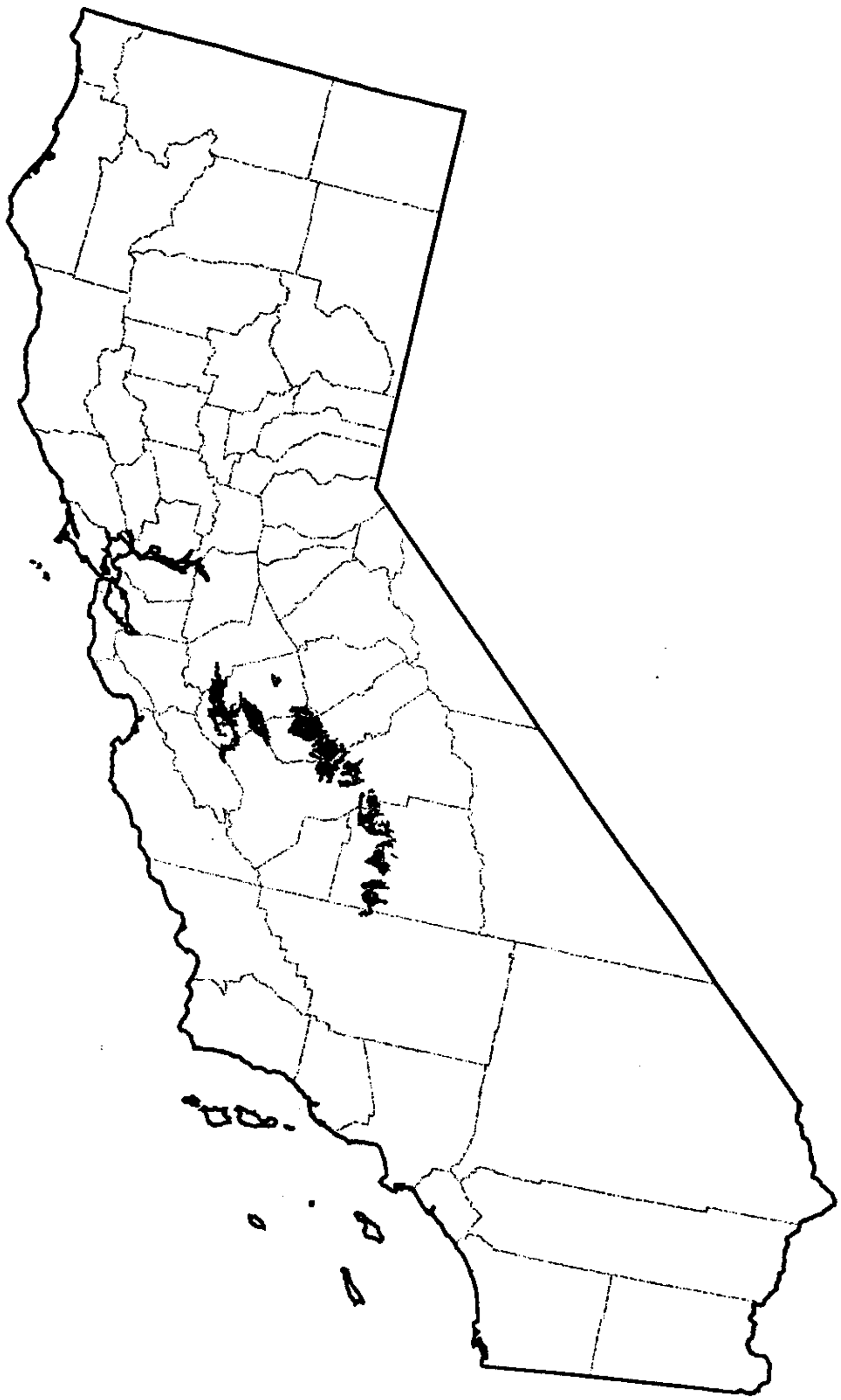
102

Figure 3d. Locations of Soils Used in Modeling - Region 7



CY 181

Figure 3e. Locations of Soils Used in Modeling - Region 11



CY 181

Table 1. Census of Agriculture Statistics on Cotton Production

1000's of Acres Planted

State	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Upland:														
AL	219	309	330	315	335	390	328	380	410	415	443	463	590	540
AZ	291	430	360	250	290	350	240	350	360	325	316	313	365	315
AR	320	470	465	490	555	695	610	770	1000	1000	990	980	1170	1000
CA	960	1410	1330	1000	1150	1350	1050	1100	980	1000	1050	1100	1170	1000
FL	13	18	25	20	30	33	26	37	50	50	54	69	110	100
GA	120	175	255	225	250	350	265	355	430	460	615	885	1500	1350
KS	0	1	1	1	1	1	2	2	2	3	2	1.4	3.8	4.5
LA	420	650	640	580	605	735	645	810	875	890	890	900	1085	890
MS	687	1045	1050	1020	1020	1230	1050	1230	1245	1350	1330	1280	1460	1120
MO	108	164	152	178	200	245	214	248	332	335	345	352	462	390
NM	56	77	70	63	66	77	61	69	69	55	54	55	61	60
NC	60	97	88	82	96	126	112	201	460	380	390	486	805	721
OK	320	425	370	400	400	460	370	380	440	370	370	360	380	290
SC	69	104	124	118	120	145	120	155	211	197	202	225	348	284
TN	220	340	340	340	440	535	465	525	620	625	625	590	700	540
TX	4000	5350	5000	4850	4700	5600	4650	5500	6300	5550	5550	5450	6400	5700
VA	0	1	1	1	2	3	3	5	18	22	23	42	107	103
SUBTOTAL	7863	11065	10601	9933	10259	12325	10210	12117	13802	13027	13248	13552	16717	14408
American-Pima														
AZ	30	51	57	74	91	128	245	125	106	103	57	48	48.6	42
CA					1	2	18	26	64	110	91	81	115	165
MS							2	1	1	0				
NM	11	10	8	11	14	18	30	19	20	13	11	11	15	14
TX	22	20	20	26	32	42	82	60	60	37	31	29	36	37
SUBTOTAL	63	80	84	112	138	190	377	231	250	263	190	169	215	258
TOTAL	7926	11145	10685	10045	10397	12515	10587	12348	14052	13290	13438	13720	16931	14666

105

CY 181

Table 2. Census of Agriculture Statistics on Cotton Production

% of Total U.S. Acres

State	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
AL	2.79	2.79	3.11	3.17	3.27	3.16	3.21	3.14	2.97	3.19	3.34	3.42	3.53	3.75
AZ	3.70	3.89	3.40	2.52	2.83	2.84	2.35	2.89	2.61	2.49	2.39	2.31	2.18	2.19
AR	4.07	4.25	4.39	4.93	5.41	5.64	5.97	6.35	7.25	7.68	7.47	7.23	7.00	6.94
CA	12.21	12.74	12.55	10.07	11.21	10.95	10.28	9.08	7.10	7.68	7.93	8.12	7.00	6.94
FL	0.16	0.16	0.23	0.20	0.29	0.27	0.25	0.31	0.36	0.38	0.41	0.51	0.66	0.69
GA	1.53	1.58	2.41	2.27	2.44	2.84	2.60	2.93	3.12	3.53	4.64	6.53	8.97	9.37
KS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.03
LA	5.34	5.87	6.04	5.84	5.90	5.96	6.32	6.68	6.34	6.83	6.72	6.64	6.49	6.18
MS	8.74	9.44	9.91	10.27	9.94	9.98	10.28	10.15	9.02	10.36	10.04	9.45	8.73	7.77
MO	1.37	1.48	1.43	1.79	1.95	1.99	2.10	2.05	2.41	2.57	2.60	2.60	2.76	2.71
NM	0.71	0.70	0.66	0.63	0.64	0.62	0.60	0.57	0.50	0.42	0.40	0.41	0.36	0.42
NC	0.76	0.88	0.83	0.83	0.94	1.02	1.10	1.66	3.33	2.92	2.94	3.59	4.82	5.00
OK	4.07	3.84	3.49	4.03	3.90	3.73	3.62	3.14	3.19	2.84	2.79	2.66	2.27	2.01
SC	0.88	0.94	1.17	1.19	1.17	1.18	1.18	1.28	1.53	1.51	1.52	1.66	2.08	1.97
TN	2.80	3.07	3.21	3.42	4.29	4.34	4.55	4.33	4.49	4.80	4.72	4.35	4.19	3.75
TX	50.87	48.35	47.17	48.83	45.81	45.44	45.54	45.39	45.65	42.61	41.89	40.22	38.28	39.56
VA	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.13	0.17	0.18	0.31	0.64	0.71
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
American-Pima														
AZ	46.83	63.05	67.26	66.37	65.99	67.51	65.00	54.04	42.33	39.10	30.00	28.49	22.65	16.28
CA	0.00	0.00	0.00	0.00	0.65	0.95	4.78	11.11	25.56	41.76	47.89	48.07	53.59	63.95
MS	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.56	0.32	0.15	0.00	0.00	0.00	0.00
NM	17.62	12.48	9.52	9.96	10.15	9.39	8.04	8.34	7.83	4.94	5.79	6.53	6.99	5.43
TX	35.56	24.47	23.21	23.68	23.21	22.15	21.76	25.94	23.96	14.05	16.32	16.91	16.78	14.34
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

106

CY181

Table 3. Census of Agriculture Statistics on Cotton Production

Region	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.03
4	8.75	9.27	10.74	10.89	12.11	12.57	12.66	13.38	15.57	16.11	17.35	19.86	24.23	24.56
5	0.16	0.16	0.23	0.20	0.29	0.27	0.25	0.31	0.36	0.38	0.41	0.51	0.66	0.69
6	23.59	24.89	25.25	26.86	27.10	27.30	28.30	28.37	28.20	30.28	29.63	28.57	27.26	25.61
7	50.87	48.35	47.17	48.83	45.81	45.44	45.54	45.39	45.65	42.61	41.89	40.22	38.28	39.56
9	0.71	0.70	0.66	0.63	0.64	0.62	0.60	0.57	0.50	0.42	0.40	0.41	0.36	0.42
11	15.91	16.63	15.94	12.58	14.04	13.79	12.64	11.97	9.71	10.17	10.31	10.43	9.18	9.13
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

American-Pima

Region	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
6	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.56	0.32	0.15	0.00	0.00	0.00	0.00
7	35.56	24.47	23.21	23.68	23.21	22.15	21.76	25.94	23.96	14.05	16.32	16.91	16.78	14.34
9	17.62	12.48	9.52	9.96	10.15	9.39	8.04	8.34	7.83	4.94	5.79	6.53	6.99	5.43
11	46.83	63.05	67.26	66.37	66.64	68.46	69.78	65.15	67.89	80.87	77.89	76.56	76.23	80.23
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

107

CY 181

Table 4. Characteristics of the Soils Used in the Modeling Scenarios

MUID	Sequence Number	Region	Bin	Component Name	SOILS5 ID	Comp. Pct.	Hydrologic Group	Surface Texture	Slope Low	Slope High
AL001	13	4	8	EMORY	TN0153	2	B	SIL	0	2
AL001	2	4	9	DICKSON	TN0042	10	C	SIL	0	2
AL015	3	4	25	COLBERT	AL0060	9	D	SICL	6	10
AL040	5	4	23	FULLERTON	TN0033	7	B	CR-SIL	12	25
AL058	15	4	19	CANE	AL0069	4	C	L	2	8
AL073	7	4	18	FULLERTON	TN0033	6	B	CR-SIL	6	10
AL076	7	4	22	CECIL	NC0018	5	B	SL	10	15
AL109	1	4	17	SMITHDALE	MS0050	20	B	FSL	5	15
AL133	5	4	14	LUVERNE	AL0082	10	C	SL	1	5
AL134	7	4	2	LUCEDALE	MS0070	7	B	FSL	0	2
AL143	5	4	10	VAIDEN	AL0017	6	D	C	0	1
AL143	6	4	15	VAIDEN	AL0017	4	D	C	1	3
AL165	7	4	20	CONECUH	AL0125	10	D	SL	2	5
AL181	9	4	4	MANTACHIE	MS0043	4	C	SL	0	1
AL237	9	4	13	LEXINGTON	TN0027	2	B	SIL	2	5
AR022	20	6	3	MHOON	LA0021	3	D	FSL	0	1
AR026	5	6	2	STASER	TN0110	1	B	SIL	0	1
AR037	4	6	17	PICKWICK	TN0029	8	B	SIL	3	8
AR043	8	6	8	SARDIS	AR0082	5	C	SIL	0	1
AR043	12	6	12	BLEVINS	AR0051	2	B	SIL	1	3
AR049	11	6	25	HOUSTON	AL0064	2	D	C	3	8
CA309	20	11	9	CENTERVIL	CA0545	3	D	C	0	3
CA360	6	11	7	ELNIDO	CA0748	5	C	CL	0	2
CA364	14	11	2	CARRANZA	CA1433	1	B	GR-CL	0	2
CA365	5	11	8	BAPOS	CA0994	3	D	SCL	0	2
CA365	2	11	13	DAMLUIS	CA1123	9	C	CL	2	8
CA366	4	11	6	APOLLO	CA1002	9	B	CL	2	8
FL012	9	5	20	LYNCHBURG	SC0037	2	C	SL	0	2
FL016	4	5	11	TROUP	AL0009	6	A	LS	5	8
FL023	9	5	14	ARDILLA	AL0037	5	C	LS	0	2
FL025	8	5	13	MALBIS	AL0059	4	B	FSL	0	2
FL025	1	5	19	CLARENDON	SC0009	34	C	SL	0	2
FL025	6	5	24	COWARTS	AL0071	5	C	LS	5	8
FL026	6	5	22	DOTHAN	AL0010	2	B	LS	5	8
FL034	9	5	25	LUVERNE	AL0082	2	C	SL	5	8
FL050	7	5	6	BONNEAU	SC0026	3	A	LS	0	5
FL050	2	5	8	ORANGEBUR	GA0029	4	B	LS	0	2
FL050	1	5	18	ORANGEBUR	GA0029	17	B	LS	2	5
FL050	14	5	23	FACEVILLE	GA0005	8	B	SL	5	8
FL054	11	5	17	WICKSBURG	AL0028	3	B	GR-COS	2	8
FL055	3	5	12	FUQUAY	NC0053	9	B	S	0	5
FL072	5	5	1	KENANSVIL	NC0075	10	A	LS	0	2
GA053	10	4	3	IRVINGTON	AL0074	5	C	SL	0	2

CY181

Table 4. Characteristics of the Soils Used in the Modeling Scenarios

MUID	Sequence Number	Region	Bin	Component Name	SOILS5 ID	Comp. Pct.	Hydrologic Group	Surface Texture	Slope Low	Slope High
LA039	5	6	15	SHARKEY	LA0050	4	D	C	0	1
LA040	13	6	20	BUXIN	LA0007	2	D	SIC	1	3
LA048	7	6	23	MEMPHIS	MS0066	2	B	SIL	8	12
LA057	3	6	9	COMMERCE	LA0041	13	C	SICL	0	1
LA069	1	6	14	COMMERCE	LA0041	39	C	SICL	0	2
LA074	19	6	19	AMAGON	AR0031	1	D	SIL	1	3
LA139	7	6	18	SHATTA	LA0020	1	C	VFSL	3	5
LA196	2	6	13	SAVANNAH	MS0083	6	C	FSL	1	3
MO042	3	6	1	BROSELEY	MO0012	5	B	LFS	0	3
MO042	2	6	6	BOSKET	AR0044	3	B	FSL	1	5
MO045	5	6	22	LORING	TN0011	1	C	SIL	9	14
MO049	4	6	11	BOSKET	AR0044	3	B	FSL	5	9
MS019	7	6	10	SHARKEY	LA0050	5	D	SICL	0	1
MS039	16	6	7	VICKSBURG	MS0081	2	B	SIL	0	2
MS089	4	6	24	KIPLING	MS0039	23	D	SIL	5	8
NC019	15	4	1	NORFOLK	NC0037	1	B	FSL	0	4
OK185	3	6	21	LEESBURG	AL0052	2	B	GR-L	8	20
OK212	5	6	4	TIAK	OK0023	2	C	FSL	5	8
OK212	3	6	16	SMITHDALE	MS0050	7	B	FSL	5	15
SC001	3	4	16	CECIL	NC0018	11	B	SL	10	15
SC047	4	4	11	BLANEY	SC0063	2	B	S	10	15
TN048	9	4	7	ENNIS	TN0001	2	B	CR-SIL	0	5
TN065	6	4	12	ETOWAH	TN0034	8	B	SIL	2	8
TN073	9	4	24	PADEN	TN0028	9	C	SIL	5	12
TX006	8	7	19	KEITHVILL	LA0088	1	C	L	1	3
TX009	7	7	22	VENUS	TX0146	12	B	L	0	15
TX066	4	7	12	BASTSIL	TX0451	4	B	FSL	0	5
TX084	6	7	17	GASIL	TX0073	4	B	FSL	3	8
TX088	2	7	11	CAREY	TX0422	5	B	L	3	5
TX161	14	7	9	LUFKIN	TX0302	1	D	FSL	0	1
TX165	2	7	18	ELMENDORF	TX0006	20	D	CL	1	4
TX194	6	7	25	ROSENWALL	TX0386	6	D	FSL	1	5
TX209	4	7	1	ACUFF	TX0128	6	B	L	0	3
TX226	3	7	24	ALTOGA	TX0295	3	C	SIC	1	12
TX228	3	7	8	RAYMONDVI	TX0169	13	D	CL	0	1
TX247	13	7	3	MANGUM	TX0277	1	D	C	0	1
TX291	6	7	7	SAGERTON	TX0253	5	C	CL	0	3
TX311	1	7	14	LUFKIN	TX0302	45	D	FSL	0	2
TX399	1	7	13	PAPALOTE	TX0037	32	C	LFS	0	3
TX423	1	7	10	PLEDGER	TX0304	50	D	C	0	1
TX442	7	7	23	ALTOGA	TX0295	5	C	CL	5	8
TX503	3	7	16	SARNOSA	TX0055	6	B	FSL	5	8
TX507	6	7	20	ADATON	MS0027	3	D	SIL	0	2
TX563	4	7	6	DEVOL	OK0061	5	B	LFS	0	8
TX590	4	7	2	WILLACY	TX0156	7	B	FSL	0	1
TX590	1	7	15	VICTORIA	TX0224	44	D	C	0	1
VA019	1	4	6	CECIL	NC0018	39	B	FSL	2	7

Table 4. Characteristics of the Soils Used in the Modeling Scenarios (continued)

MUID	Sequence Number	Sand Low	Sand High	Clay Low	Clay High	OM Low	OM High	pH Low	pH High	Available Water Capacity Low	Available Water Capacity High	Depth of Layer
AL001	2	75	95	15	26	0.5	2.0	4.5	5.5	0.18	0.22	7
AL001	13	80	95	19	35	1.0	4.0	5.1	6.0	0.17	0.21	8
AL015	3	80	95	27	40	0.5	2.0	4.5	6.5	0.15	0.20	8
AL040	5	30	70	15	27	0.5	2.0	4.5	5.5	0.10	0.16	15
AL058	15	40	75	7	18	0.5	1.0	5.6	6.5	0.10	0.18	5
AL073	7	30	70	15	27	0.5	2.0	4.5	5.5	0.10	0.16	15
AL076	7	26	42	5	20	0.5	1.0	4.5	6.5	0.12	0.14	7
AL109	1	28	49	2	15	0.5	2.0	4.5	5.5	0.14	0.16	11
AL133	5	30	60	7	20	0.5	1.0	3.6	5.5	0.11	0.15	7
AL134	7	25	65	1	10	0.5	2.0	5.1	6.5	0.15	0.20	8
AL143	5	70	90	25	55	0.5	2.0	4.5	6.5	0.10	0.15	4
AL143	6	70	90	25	55	0.5	2.0	4.5	6.5	0.10	0.15	4
AL165	7	40	70	7	25	0.5	2.0	3.6	5.5	0.10	0.15	5
AL181	9	40	60	8	20	1.0	3.0	4.5	5.5	0.16	0.20	11
AL237	9	70	100	12	30	0.1	2.0	4.5	6.0	0.17	0.22	7
AR022	20	40	55	5	20	0.5	2.0	6.1	7.8	0.11	0.15	6
AR026	5	55	80	18	27	2.0	4.0	5.6	7.3	0.15	0.22	35
AR037	4	70	95	12	22	0.5	3.0	4.5	5.5	0.20	0.23	6
AR043	8	50	90	10	25	1.0	3.0	4.5	6.0	0.15	0.24	7
AR043	12	40	90	3	20	1.0	3.0	4.5	5.5	0.13	0.24	7
AR049	11	90	95	50	67	2.0	5.0	6.1	8.4	0.12	0.16	10
CA309	20	75	95	40	60	1.0	2.0	6.6	8.4	0.12	0.15	18
CA360	6	70	80	27	30	1.0	3.0	7.4	8.4	0.15	0.18	18
CA364	14	40	55	27	35	1.0	2.0	6.6	7.3	0.14	0.17	12
CA365	2	65	80	35	40	1.0	3.0	7.4	8.4	0.17	0.20	22
CA365	5	35	50	20	30	0.5	1.0	7.4	7.8	0.14	0.16	12
CA366	4	70	80	27	30	1.0	2.0	7.4	8.4	0.17	0.19	10
FL012	9	25	55	5	20	0.5	5.0	3.6	5.5	0.09	0.13	10
FL016	4	10	40	2	12	0.5	1.0	4.5	6.0	0.08	0.12	53
FL023	9	10	30	3	14	0.5	1.0	4.5	6.0	0.06	0.11	9
FL025	1	20	40	5	15	0.5	3.0	4.5	6.5	0.10	0.14	15
FL025	6	13	30	3	10	0.5	2.0	4.5	5.5	0.06	0.10	8
FL025	8	40	62	10	25	0.5	1.0	4.5	6.0	0.10	0.15	7
FL026	6	13	30	5	15	0.0	0.5	4.5	6.0	0.06	0.10	13
FL034	9	30	60	7	20	0.5	1.0	3.6	5.5	0.11	0.15	7
FL050	1	14	28	4	10	0.5	1.0	4.5	6.0	0.06	0.09	7
FL050	2	14	28	4	10	0.5	1.0	4.5	6.0	0.06	0.09	7
FL050	7	15	35	5	15	0.5	2.0	4.5	6.0	0.05	0.11	22
FL050	14	17	38	5	20	0.5	2.0	4.5	5.5	0.06	0.09	5
FL054	11	2	12	1	8	0.5	1.0	4.5	6.0	0.02	0.06	26
FL055	3	5	20	1	7	0.5	2.0	4.5	6.0	0.03	0.07	34
FL072	5	10	25	3	10	0.5	2.0	4.5	6.0	0.04	0.10	24
GA053	10	30	60	7	20	0.5	2.0	4.5	6.5	0.10	0.15	6

CY181

Table 4. Characteristics of the Soils Used in the Modeling Scenarios (continued)

MUID	Sequence Number	Sand Low	Sand High	Clay Low	Clay High	OM Low	OM High	pH Low	pH High	Available Water Capacity Low	Available Water Capacity High	Depth of Layer
LA039	5	95	100	40	60	0.5	4.0	5.1	8.4	0.07	0.14	9
LA040	13	95	100	40	55	2.0	4.0	6.1	7.8	0.09	0.19	6
LA048	7	90	100	8	22	1.0	2.0	4.5	6.0	0.20	0.23	9
LA057	3	90	100	27	39	0.5	4.0	5.6	8.4	0.15	0.19	10
LA069	1	90	100	27	39	0.5	4.0	5.6	8.4	0.15	0.19	10
LA074	19	70	90	12	25	1.0	2.0	4.5	6.5	0.16	0.24	7
LA139	7	55	90	5	20	0.5	3.0	4.5	6.0	0.18	0.22	6
LA196	2	30	65	3	16	0.5	3.0	3.6	5.5	0.13	0.16	11
MO042	2	30	55	5	15	0.5	2.0	5.1	6.5	0.10	0.15	7
MO042	3	20	50	8	12	0.5	1.0	5.1	6.5	0.09	0.12	37
MO045	5	90	100	8	18	0.5	2.0	4.5	6.0	0.20	0.23	7
MO049	4	30	55	5	15	0.5	2.0	5.1	6.5	0.10	0.15	7
MS019	7	95	100	27	35	0.5	4.0	5.1	8.4	0.20	0.22	9
MS039	16	70	100	5	18	1.0	3.0	4.5	5.5	0.20	0.24	7
MS089	4	70	90	16	29	0.5	2.0	3.6	6.0	0.20	0.22	3
NC019	15	15	33	5	18	0.5	2.0	3.6	6.0	0.10	0.15	14
OK185	3	15	55	5	18	0.5	2.0	4.5	5.5	0.08	0.16	6
OK212	3	28	49	2	15	0.5	2.0	4.5	5.5	0.14	0.16	11
OK212	5	36	60	10	18	0.5	1.0	4.5	6.0	0.10	0.15	8
SC001	3	26	42	5	20	0.5	1.0	4.5	6.5	0.12	0.14	7
SC047	4	8	30	2	10	0.5	1.0	4.5	6.0	0.03	0.06	25
TN048	9	35	70	12	25	1.0	3.0	4.5	6.0	0.10	0.15	10
TN065	6	45	70	15	27	1.0	3.0	4.5	5.5	0.15	0.20	7
TN073	9	75	90	18	32	0.5	3.0	4.5	5.5	0.18	0.23	8
TX006	8	60	75	8	22	0.5	2.0	3.6	6.0	0.15	0.20	9
TX009	7	50	80	18	30	1.0	2.0	7.9	8.4	0.15	0.20	14
TX066	4	36	70	7	20	0.5	2.0	5.1	7.3	0.11	0.15	16
TX084	6	36	55	8	20	0.5	1.0	6.1	7.8	0.11	0.15	17
TX088	2	65	95	10	25	1.0	3.0	6.6	7.8	0.15	0.20	14
TX161	14	40	85	5	18	0.5	2.0	5.1	6.5	0.11	0.18	8
TX165	2	65	90	20	34	1.0	3.0	6.1	8.4	0.15	0.20	16
TX194	6	45	70	8	20	0.5	2.0	4.5	6.5	0.11	0.15	6
TX209	4	51	70	13	30	1.0	2.0	6.6	7.8	0.12	0.18	12
TX226	3	70	99	40	50	0.5	2.0	7.9	8.4	0.15	0.18	7
TX228	3	51	85	32	42	1.0	3.0	7.9	8.4	0.12	0.18	14
TX247	13	90	100	40	60	1.0	3.0	7.9	8.4	0.14	0.18	7
TX291	6	55	80	20	35	1.0	3.0	6.6	7.8	0.15	0.20	7
TX311	1	40	85	5	18	0.5	2.0	5.1	6.5	0.11	0.18	8
TX399	1	20	50	4	15	0.0	1.0	5.6	7.8	0.07	0.11	16
TX423	1	75	100	40	80	1.0	3.0	6.1	7.8	0.11	0.16	5
TX442	7	70	99	35	40	0.5	2.0	7.9	8.4	0.15	0.18	7
TX503	3	20	45	8	25	1.0	3.0	7.9	8.4	0.10	0.15	16
TX507	6	84	100	10	16	1.0	3.0	4.5	5.5	0.20	0.22	6
TX563	4	15	35	2	8	0.5	1.0	6.6	7.8	0.07	0.11	14
TX590	1	70	90	40	55	1.0	3.0	7.9	8.4	0.18	0.21	12
TX590	4	30	45	10	20	1.0	3.0	6.6	7.8	0.14	0.18	14
VA019	1	26	42	5	20	0.5	1.0	4.5	6.5	0.12	0.14	7

CY181